POWER PROCESSING UNITS FOR HIGH POWERED SOLAR ELECTRIC PROPULSION USING MPD THRUSTERS

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Abstract

The power of various multimegawatt (MMW) vehicles required for deep space missions such as the Mars Missions in the stipulated time frame of years 2000-2015 ranges from 5 to 100 MWe. This paper summarizes an evaluation of high-power processing units (PPUs) for MMW solar electric propulsion (SEP) vehicles using advanced magnetoplasma-dynamic (MPD) thrusters. Each PPU provides DC-DC conversion and voltage matching between the phovoltaic power system and the MPD thrusters. The power system consists of DC-DC converter using MCTs. The PPUs are then combined with contactors to provide PPU input and output isolation, and to allow switching between operating and spare (redundant) PPUs and thrusters as needed.

Based on analyses, it is found that significant economies of scale are possible for PPUs that supply power to MPD thrusters operating at 0.1 to 5 MWe per thruster.